national accelerator laboratory

TM-605
9000.000

MAGNET MEASUREMENT ON THE MEDICAL-LINE EXTRACTION MAGNETS 32° H-TYPE AND 58° C-TYPE MAGNETS

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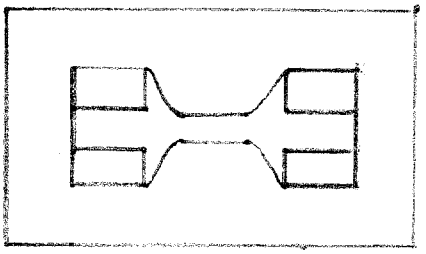
On July 3 and 11, 1975, Hall probe measurements were made on the 32° H-type and 58° C-type bending magnets for the Medical Facility. Measurements were done on both magnets using a F.W. Bell 640 gaussmeter with a 0.1% transverse probe. A Dana 5500 Digital vollmeter was used for the external readout of field. An excitation curve from zero to 1200 Amperes was measured in a current-up and current-down mode to average errors from hysteresis and current settings.

The field shape in the x direction was also measured using the same Hall probe. The probe was hand-held and moved across a template on the gap spanning as much of the x distance as possible. The data were then normalized to percentage of the field measured at the center and graphed. The accuracy of the B vs. I data is about 1% and the field shape data is about 0.5% in the central region.

The internal transductor of the transrex 240 power supply which will power one of the magnets was used as the monitor of the current levels.

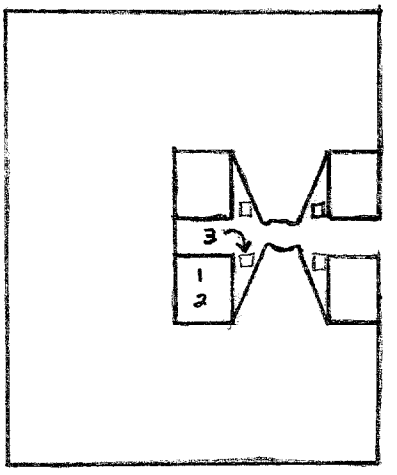
Medical Magnets

H-Type 32°



turns =	48
Gap center =	1.625"
Gap (min) at ends of pole tip	1.588"
Width of Gap	10.125"
Steel length	16"
width	16.5"
height	11.5"
thickness	.0625"
Wire	.325"x.325" square
Cooling hole	.180" dia.
Coils	Normal wind
Chamber	None

C-Type 58°



Main turns	60 - (1)
Bucking coil (parallel) turns	60 - (2)
Auxiliary coil turns	18 - (3)
Gap center	1.375"
Gap (min) at ends of pole tip	1.250"
Gap width total	10"
Steel length	25"
width	17.5"
height	20.5"
thickness	.0625"
Wire main coil (1)	.325"x.325"
Cooling hole	.180" dia.
Wire boost coil (3)	.125"x.125"
no cooling	
Bucking (2)	.015x.325"
Chamber	None

Medical Magnets

B verses I

With T 6010 Hall Probe

	32°	58°
Amps	H-Type	C-Type
0	.013 kG	.030
120	1.67	2.78
240	3.34	5.53
360	5.02	8.28
480	6.67	10.98
600	8.34	13.61
720	9.97	16.04
840	11.56	18.04
960	13.09	19.60
1080	14.37	20.55
1200	15.46	-----

Medical Magnet 32° H-Type

Field-Shape Data

Per Cent Change in Field

From Center X-Direction

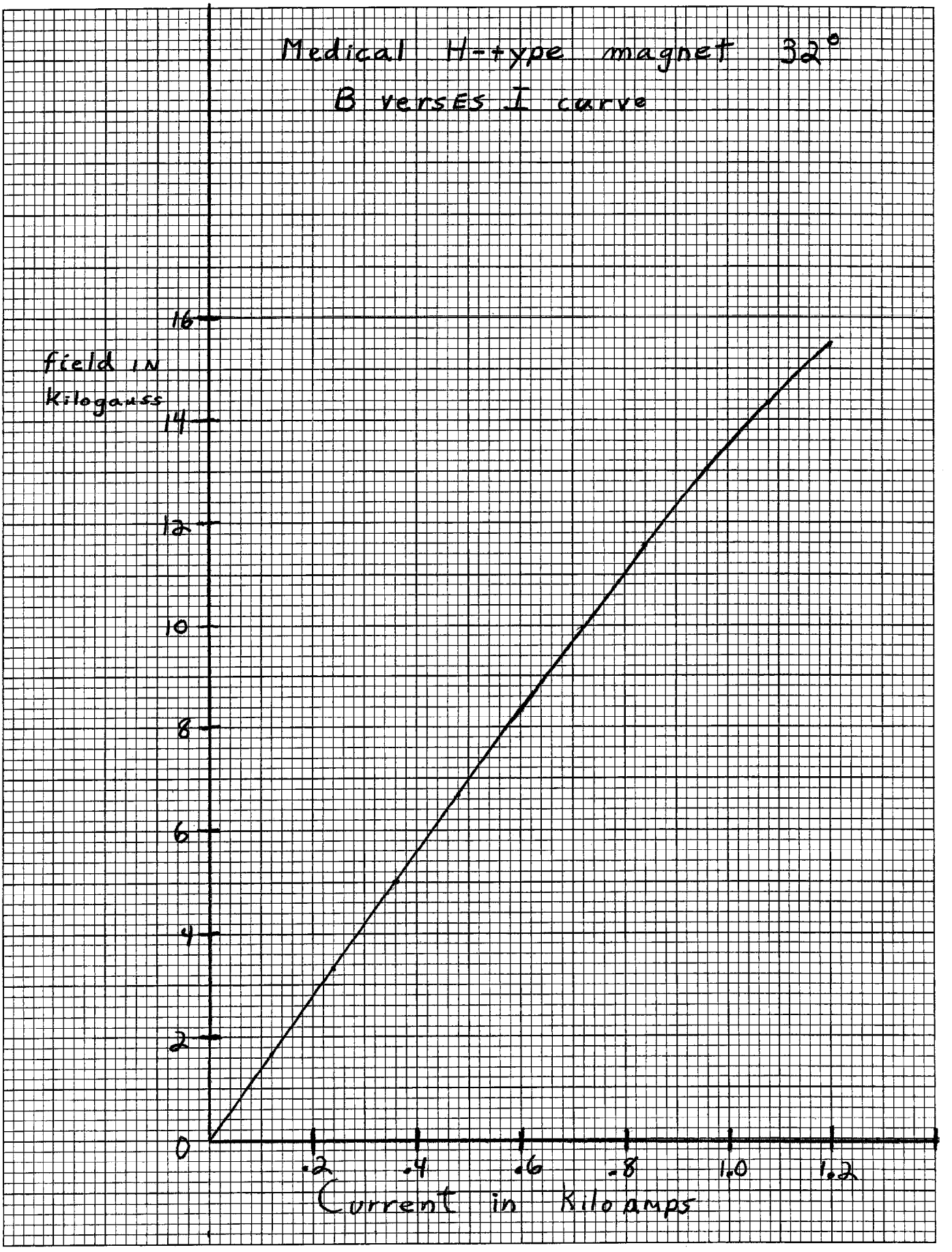
Position Centimeters	Run I Per Cent	Run II Per Cent	Run Ave Per Cent
1	-25.	-27.	-26.
2	-15.	-14.	-15.
3	-5.	-3.	-4.
4	-0.5	+.2	-.2
5	+0.2	0	+.1
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	-0.2	-3.5	-1.8
11	-4.	-4.	-4.
12	-25.	-23.	-24.

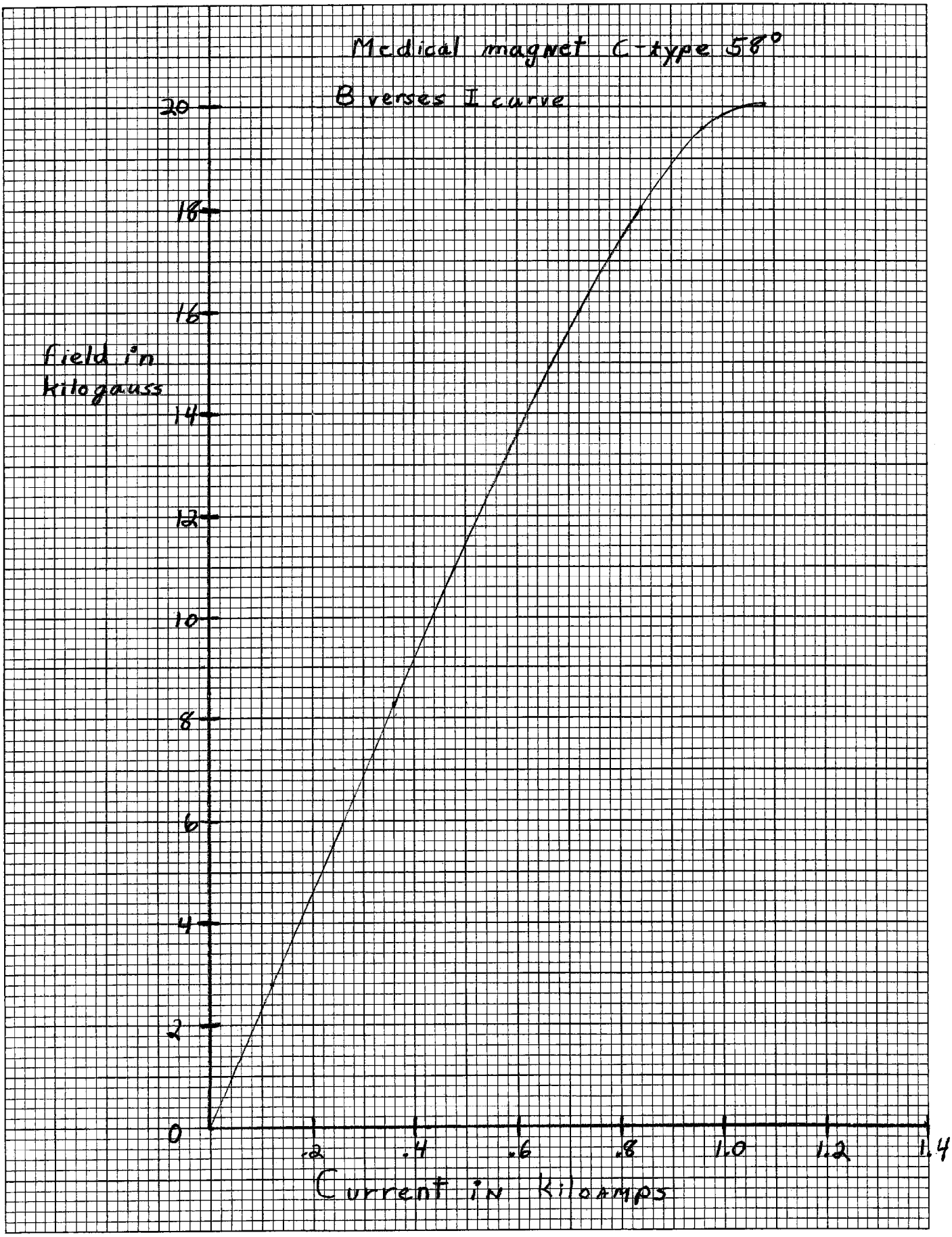
Medical Magnet 58° C-Type

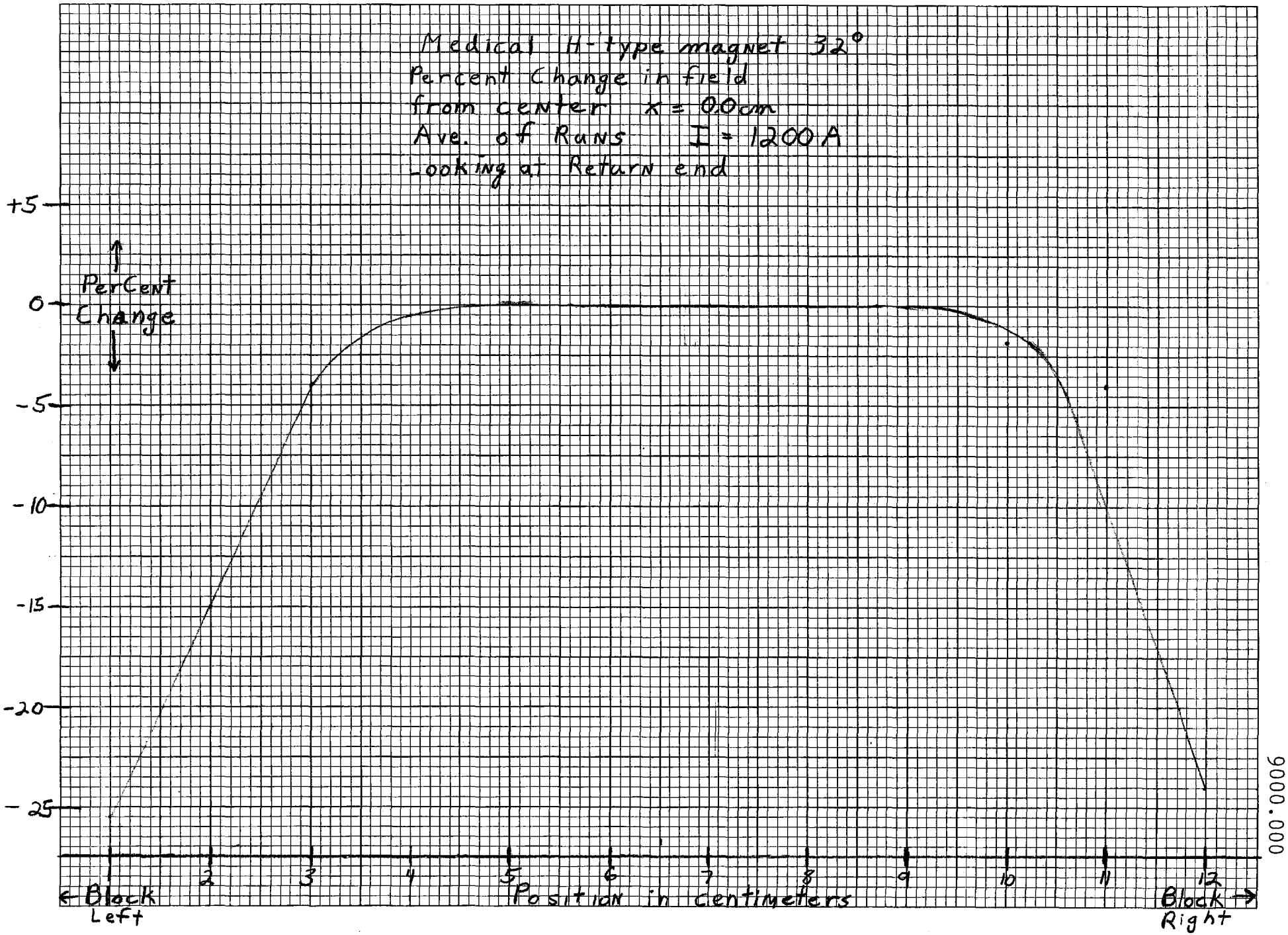
Field-Shape Data

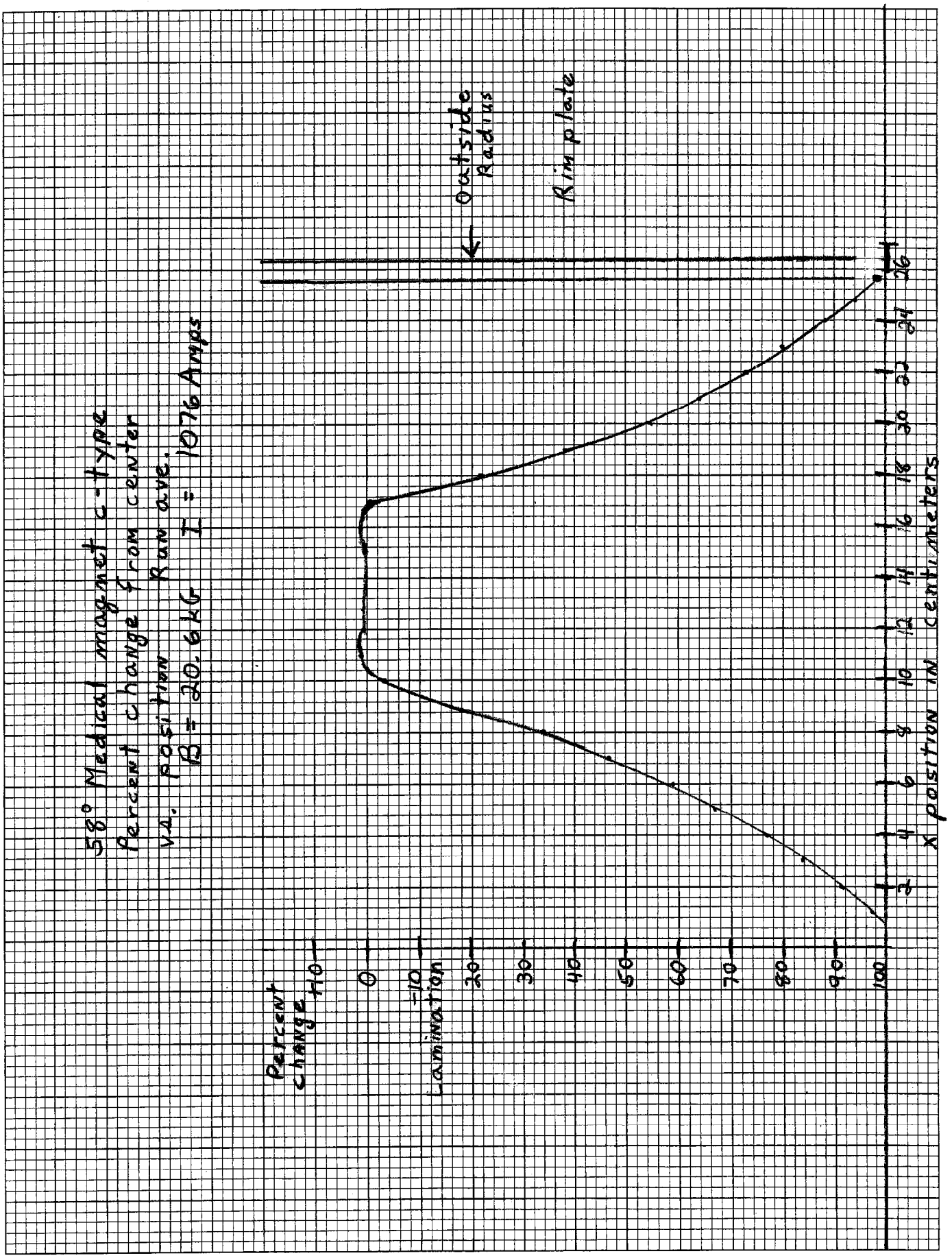
Per Cent Change From Center to Edges X-Direction

Laminations = 0 Position Centimeters	Run I Per Cent	Run II Per Cent	Run Ave Per Cent
-1	-97.	-97.	-97.
-2	-91.	-91.	-91.
-3	-84.	-84.	-84.
-4	-77.	-77.	-77.
-5	-66	-68	-67
-6	-58	-60	-59
-7	-46	-49	-47
-8	-33	-35	-34
-9	-15	-18	-16
-10	-2	-4	-3
-11	+.9	+1.0	+.9
-12	.1	.1	.1
-13	.2	.1	.2
14	.0	0	0
15	.2	.1	.1
16	+.5	+.8	+.7
17	-8.	-1.	-5.
18	21	23	22
19	34	41	38
20	54	56	55
21	65	63	64
22	73	72	73
23	80	79	80
24	88	87	88
25	94	94	94
26	100	95.	97.
27	100	100	100


Medical H-type magnet 32°
B verses I curve
field in Kilogauss
16
14
12
10
8
6
4
2
0
.2
.4
.6
.8
1.0
1.2
Current in Kiloamps


Medical magnet C-type 58°
B verses I curve
Field in kilogauss
20
18
16
14
12
10
8
6
4
2
0
.2
.4
.6
.8
1.0
1.2
1.4
Current in kiloamps


Medical H-type magnet 32°
Percent Change in field
from center x = 0.0cm
Ave. of Runs I = 1200 A
Looking at Return end
+5
0
-5
-10
-15
-20
-25
Percent Change
1
2
3
4
5
6
7
8
9
10
11
12
← Block Left
Position in centimeters
Block Right →


58° Medical magnet c-type
Percent change from center
vs. position Ran ave.
B = 20.6KG I = 1076 Amps
Rim plate
Outside Radius
Percent change
Lamination
+10
0
-10
20
30
40
50
60
70
80
90
100
X position in centimeters